

The Automobile Simplified

By FREDERICK C. GUERRICH, M. E.

AN intimate talk on the working units of the automobile discussed in such a way that the layman can easily understand them.

If in reading these articles, as they appear in The World each Sunday, there is anything not clear to you, ask Mr. Guerrich about it. An answer will be published on the completion of the articles on the section of the automobile under discussion.

MAKE THIS YOUR AUTOMOBILE CORRESPONDENCE SCHOOL.
Address all inquiries to Auto Editor, Tulsa World, Tulsa, Okla.

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FOURTH LESSON.
Ignition.

We now come to the study of the ignition system, that is, of the devices which are used to ignite the explosive compressed mixture of gas and air, which we have in the cylinders.

In the automobile this is accomplished by the utilization of some of the well-known properties and action of an electric current. To under-

stand the ignition system, therefore, we must know some of the simple laws of electricity, and I will first explain these laws and what the various terms used so often mean.

By comparing the flow of an electrical current through a wire, to the flow of water through a pipe, I believe I can more readily make you understand these laws and terms.

First of all, if you had a line of pipe with a water motor or other water-operated device at one end, and you wanted water to flow through this pipe, you would have to have some pressure at the source to force it through. If you knew what the pressure were you would say that it was a certain number of pounds. So, likewise, to have a current of electricity flow through a wire, electric motor or other electrically-operated device, you would have to have a pressure at the source to force the current through. An electrician would say that the current had a certain number of "volts" pressure. The volt, therefore, is the unit of measure of electrical pressure.

This should explain to you the terms high voltage or low voltage, they mean high pressure or low pressure.

It might be well to explain to you here that, while tension means pull, and, therefore, the opposite of pressure, but high tension and high voltage really mean the same thing when used in defining an electrical current.

While the current under pressure above referred to must come from the source of current that is, the battery, dynamo, etc. it must also, after having done the things required of it, return to this source. We might, therefore, instead of saying it is pressed out from the one side, say that it is drawn or pulled, sort of sucked, into the return side. Thus it

will be under a pull or tension, instead of pressure.

What does the ampere, or amperage mean? Referring again to our pipe, with water flowing through it, if you wanted to know how much was passing through during a minute, say, you would put a meter in the line and measure the number of gallons. So, likewise, you can measure the amount of current passing through a wire, but instead of saying gallons, the electrician says amperes, or that the current has certain amperage.

Thus the ampere is the unit of measure of the electrical rate of flow, or of the quantity flowing.

There are certain materials, such as rubber, mica and porcelain, through which an electrical current

cannot pass, likewise there are materials through which it can pass freely. The former we call nonconductors or insulating materials, the latter conductors.

The Spark.
Here, I believe, is the place to explain the electrical action, which more than any other is used to give the spark by which the gases are ignited.

Coming back to water, if we had a pipe with water under a low pressure in it, we could fasten a piece of cardboard to the end of this pipe and it would stop the flow of the water; but if we raised the pressure of the water sufficiently it would burst through this cardboard, probably with a loud report. Of course, the thicker the cardboard the greater would have to be the pressure.

Air will act much the same in stopping the flow of electricity as the cardboard does that of water. Thus a thin layer of air will resist the flow of electricity under a low pressure, but if the pressure, or voltage, be raised sufficient the electricity will burst through this layer of air, and in

doing so will cause a spark to be produced.

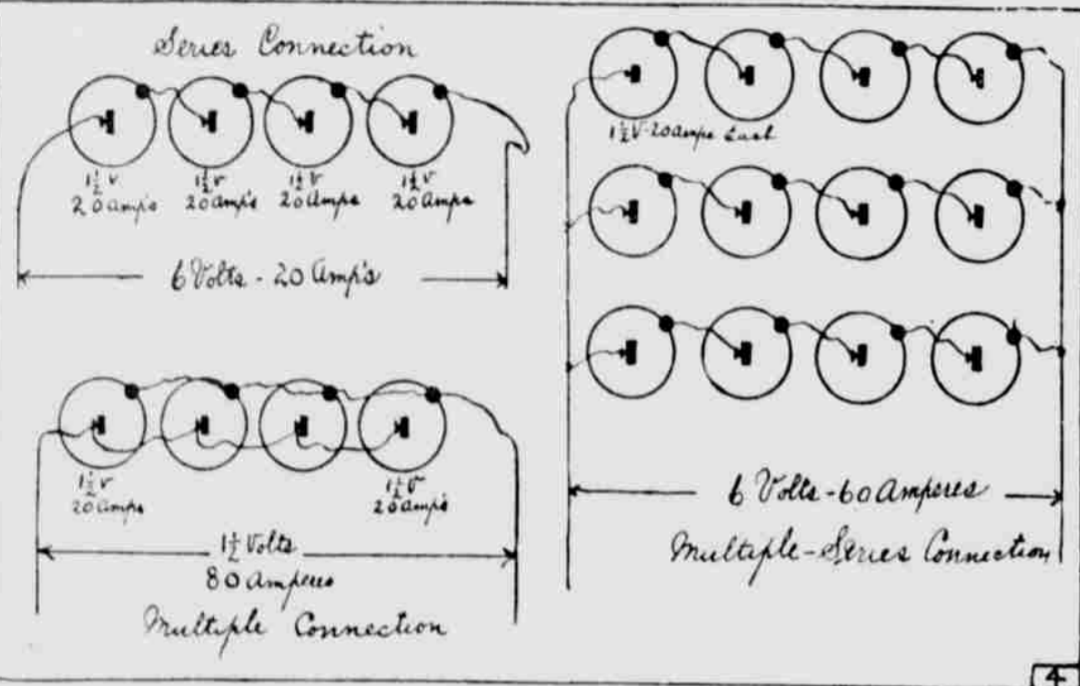
It is the above action which is used to give the spark required to ignite the gasoline mixture in the cylinder of the engine.

Examining now a spark plug. You will notice that the portion of the plug which is screwed into the cylinder has attached to it a small piece of wire, or a number of small points, which are about 1-16 to 1-32 of an inch from another wire. This last wire runs through a piece of porcelain, mica or other non-conducting material, so as to be insulated from the portion of the plug screwed into the cylinder. The other end having a screw by which the wire carrying the current can be fastened to it.

If now we connected a wire to the cylinder and another to the screw above mentioned, and then send a current of electricity under a high pressure through this wire, the current will go through the porcelain insulated wire until it comes to the 1-16" or 1-32" air space, and then burst or jump across this space, giving a spark as it does so. It will then go through the iron of the cylinder to the wire which is connected to them.

The pressure or voltage required to cause the current to break through, or jump across the air gap, must be extremely great, far greater than it is practical to carry enough batteries; or

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